Item 6

CARSON CITY UTILITY FINANCIAL OVERSIGHT COMMITTEE
REQUEST FOR COMMITTEE ACTION

Date Submitted: May 22, 2014 **Meeting Date:** June 3, 2014

To: Utility Financial Oversight Committee

From: Darren Schulz, Public Works Director

Subject Title: For Possible Action: To review a report from Manhard Consulting, Ltd regarding effluent availability and the use of domestic water for augmenting irrigation demands.

Staff Summary: The Committee will review a report prepared by Manhard Consulting, Ltd regarding effluent availability and the use of domestic water for augmenting irrigation demands of the prison farm and golf courses and may make recommendations to the Board of Supervisors.

Type of Action Requested: (check one)
( ) None – Information Only
(x) Formal Action/Motion

Recommended Commission Action: I move to recommend to the Board of Supervisors continued use of domestic water for augmenting effluent shortfalls with costs to be paid utilizing wastewater operating funds.

Explanation for Recommended Commission Action. Wastewater Treatment Facility flows have reduced significantly over the last 13 years and the reduced effluent amount available for irrigation use has resulted in a shortage. Projections indicate a shortage of 500 to 900 acre feet annually resulting in the need to augment the effluent with potable water. Options are presented to outline the costs and potential short and long term considerations.

Applicable Statue, Code, Rule or Policy: N/A

Fiscal Impact: Cost to the wastewater fund for augmenting the water fund in the range of approximately $100,000- $300,000 annually.

Alternatives: Other direction by the Committee.

Supporting Material: Manhard Consulting, Ltd Report

Prepared By: Darren Schulz, Public Works Director

Reviewed By:

_____ Date: _____
(Public Works Director)

_____ Date: _____
(Finance Director)

_____ Date: _____
(District Attorney's Office)

Committee Action Taken:

Motion: _____ 1) _____ Aye/Nay
2) _____ _____
_____
_____
_____
_____

_____ (Vote Recorded By)

CARSON CITY

RECLAIMED WATER ANALYSIS

Prepared for:

Carson City Public Works

Carson City, Nevada

Prepared by:

Manhard™
CONSULTING LTD

3476 Executive Pointe Way #12

Carson City, Nevada, 89706

May 27, 2014

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CARSON CITY

RECLAIMED WATER ANALYSIS

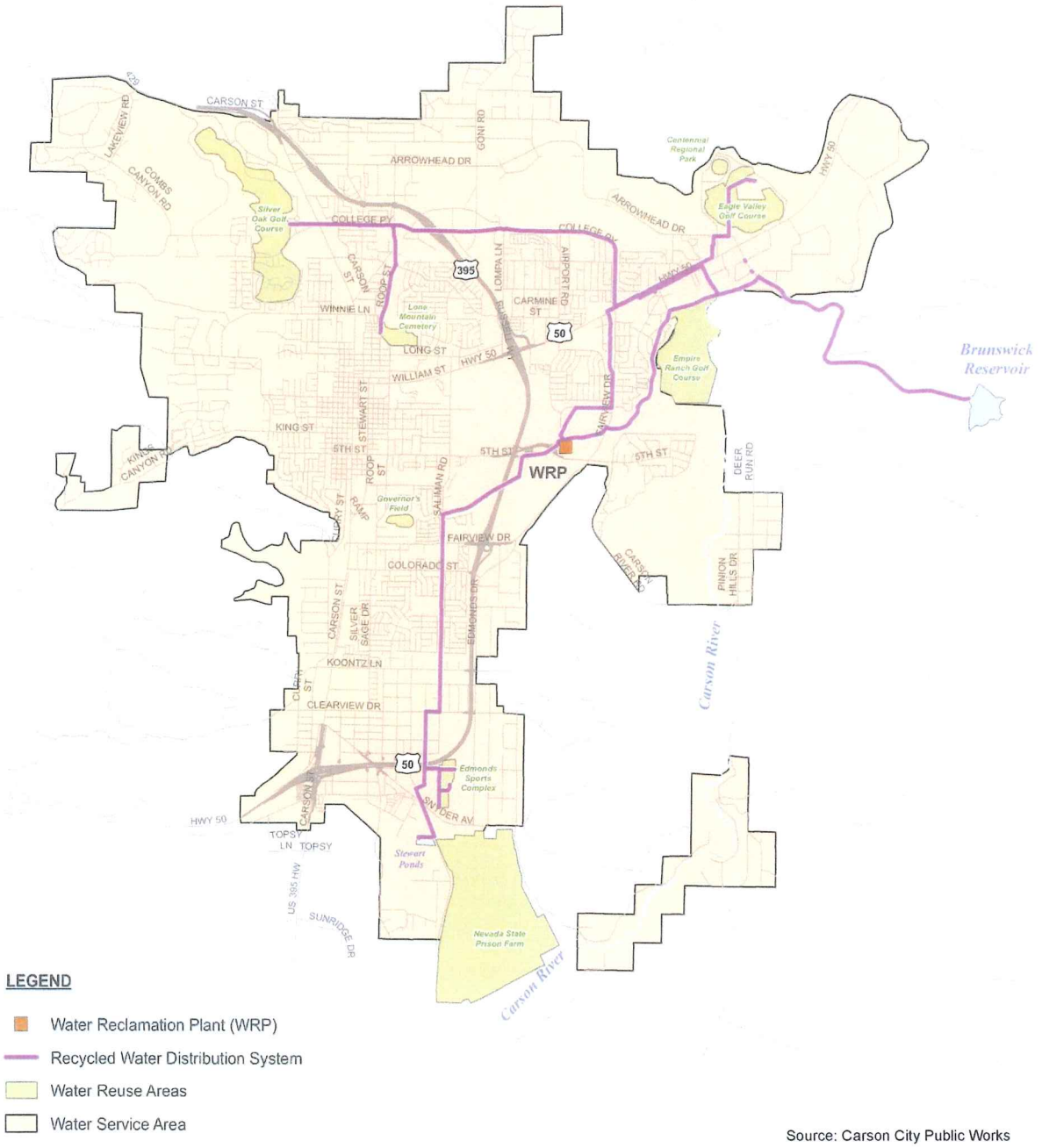
INTRODUCTION

Carson City, Nevada's Wastewater Treatment Plant (WWTP) has produced treated effluent that has been stored in Brunswick Canyon Reservoir in the winter months and delivered to a number of sites for irrigation during the spring, summer, and fall. The irrigation sites include the South Carson Prison Farms, Empire Ranch Golf Course, Eagle Valley Golf Course, Silver Oak Golf Course, and a number of Carson City Park facilities. Figure 1 shows the reclaimed water reuse areas and the related reclaimed distribution system. In addition to the irrigated areas outlined, reclaimed water fill stations have been provided for water trucks providing dust control throughout the city.

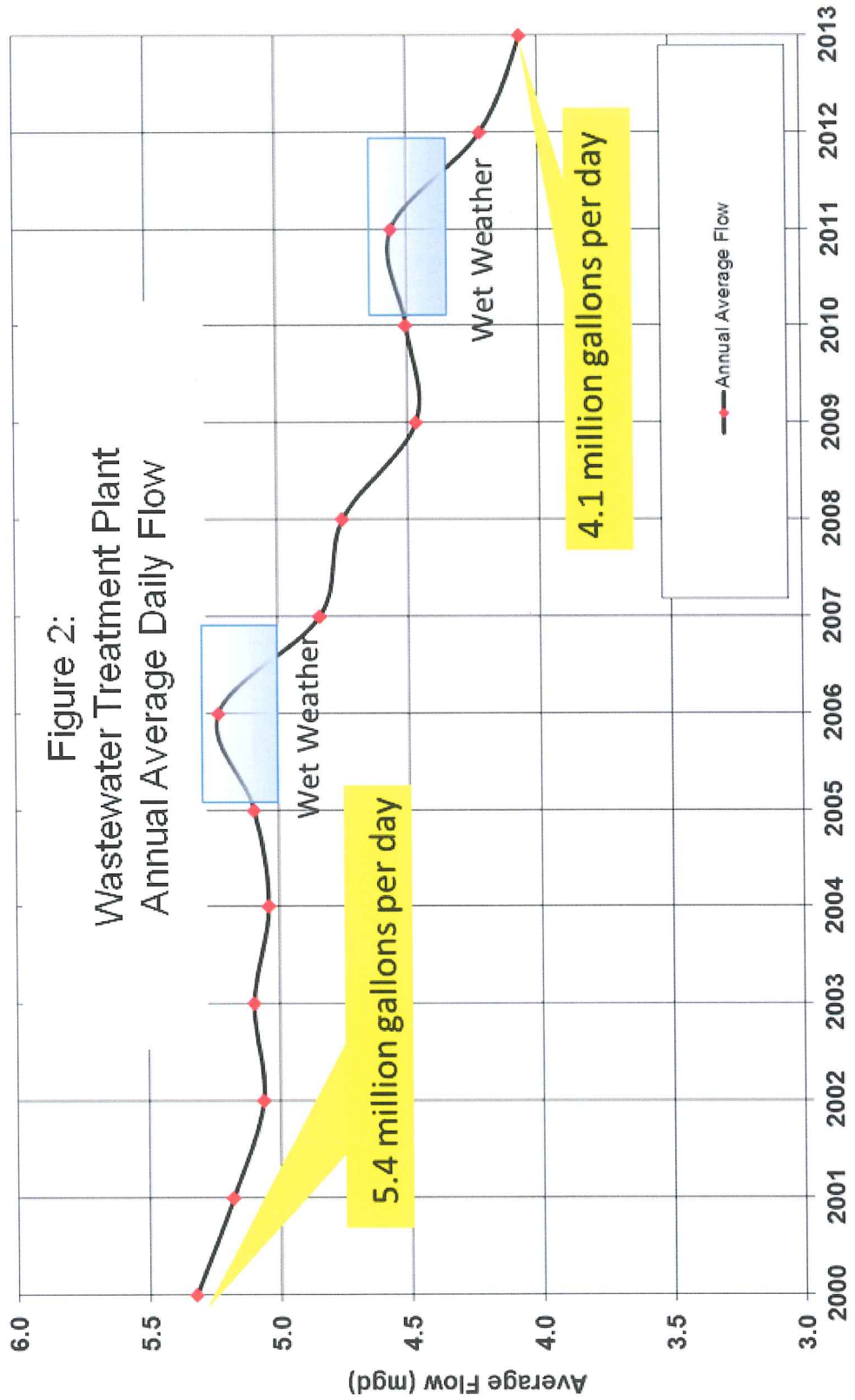
The wastewater treatment facility has experienced a significant reduction in average daily flow from 5.5 million gallons per day (mgd) in the year 2000 to a current average of 4.1 mgd. Figure 2 is a graph showing the average flows over the last 13 years. The flow reduction has resulted in a shortage of reclaimed water needed to continue irrigation of the sites that have been historically irrigated. Starting in 2013, an augmentation of potable water was utilized to meet the needs of the historically irrigated sites. Carson City Public Works, in recognition of the reduction of reclaimed water flows, worked to remove the Carson City park facilities and the dust control fill stations from the reclaimed system. With another dry winter in 2013-2014, it has become apparent that there will be a shortage of reclaimed water to provide irrigation to the remaining sites in 2014 and into the future.

Manhard Consulting has been tasked with reviewing all pertinent information provided by Carson City and its' consultants related to the reclaimed water situation, provide an analysis of the historical data, develop projections, and provide alternatives to the current and future reclaimed water shortage challenge.

FIGURE 1: RECLAIMED WATER SYSTEM MAP



Source: Carson City Public Works



Source: Carson City Public Works

HISTORICAL OVERVIEW

Carson City Public Works provided Manhard Consulting considerable data for review and analysis of the current Carson City reclaimed water shortage. Data included meter history of the plant flows, reclaimed water site usage, studies by Carollo and BHC Consultants related to the wastewater treatment facilities, agreements for effluent use, and miscellaneous related data.

The reduction in wastewater treatment plant flows from 5.4 mgd to the current 4.1 mgd occurred from 2000 to 2013 with the most significant reduction occurring since 2006. During the early 2000's, the studies and concerns over reclaimed water were how to manage the excess reclaimed water and where to expand for reclaimed use. With the un-predicted reduction in WWTP flows, the current situation results in a need to address reclaimed shortage.

While it is hard to detail the basis for the reduction in WWTP flows, a number of reasons can be cited. A general trend of reduced wastewater flows are recognized by many of the area wastewater agencies and are generally explained by the use of low flow fixtures in new and remodeled construction, more efficient appliances such as dishwashers and clothes washers, and the general conservation by consumers based on the economy and general practices. Additional reduction in Carson City can be attributed to the reduction of infiltration into the collection system that occurs in older lines located in high groundwater areas. A significant number of wastewater collection mains have been reconstructed with the freeway project and most were located in high groundwater areas. In addition, drought conditions can contribute to the lowering of the groundwater table thereby removing the groundwater influence on areas of the older collection system. While it is not unusual to expect some reduction in flows based on these considerations, the amount of reduction of 5.4 mgd to 4.1 mgd has been significant.

Carson City recognized the need early on to be able to discharge reclaimed water to irrigated areas and worked towards developing agreements to assure the ability to dispose of reclaimed water. The result included agreements with the State of Nevada for the South Carson Prison Farms, the Darling Ranch (currently Empire Ranch Golf Course), and Silver Oak Golf Course. Eagle Valley Golf Course was originally developed to provide a location for reclaimed water disposal as well as the economic and recreation benefit to the City. The agreements outline minimum and maximum amount of delivery. Carson City Municipal code outlines the priorities of these uses and indicates the priority order to be the following. Included are the minimum and maximum amounts outlined as well:

Table 1 - PRIORITIES

		Min Quantity (Acre Feet)	Max Quantity (Acre Feet)
1	. State of Nevada Prison Farms	1100	3000
2	. Darling Ranch (Empire Ranch)	790	1385
3	Eagle Valley Golf Course	1000	
4	Silver Oak Golf Course	500	790

While Manhard Consulting has reviewed the agreements and Municipal code related to the priorities and amount of reclaimed intended to be utilized by the parties, Manhard is taking an engineering approach to the review of the reclaimed water challenge and recommends legal review to determine the legal aspects of the agreement amounts and priorities.

While the wastewater plant flows reduced in the last 13 years, the reclaimed total usage has varied from 2500 acre feet to over 4000 acre feet in the early 2000's. Manhard has taken the last four years of meter data to provide a more current picture of plant flows and related reclaimed out flows. The average annual plant flows ranged from 4.5 and 4.6 mgd in 2010 and 2011 to 4.2 and 4.1 mgd in 2012 and 2013. Manhard and Public Works chose this data set recognizing that 2010 and 2011 were average to wet weather years and 2012-2013 represented lower than average precipitation years. This period should also represent the most recent reclaimed usages for the various irrigated areas.

A significant variable exists within the Carson City wastewater system and is important in considering the reclaimed water shortage. As indicated previously, reclaimed water is pumped to the Brunswick storage reservoir during the winter months and holds the varied storage throughout the year. Historic data indicates that the storage reservoir has losses associated with evaporation and leakage. The amount of loss at the reservoir can be summarized by the difference in the plant flows and the reclaimed usage. This loss variable has changed over time from as much as 2000 acre feet to as little as 1500 Acre feet.

Appendix A holds the spreadsheet calculations for the reclaimed usage for the period from 2010 to 2013 and the following is a summary table of the results in acre feet:

Table 2 - RECLAIMED USAGE 2010-2013 (ACRE FEET)

	2010	2011	2012	2013	AVE	MAX
Prison Farms	1397	1510	968	1083*	1240	1510
Empire Ranch	536	531	680	765	628	765
Eagle Valley	792	778	920	828	830	920
Silver Oak	428	420	486	465	450	486
Parks, Dust	205	182	197	162	187	205
TOTALS	3358	3421	3251	3303	3335	3886

*Carson meter error, utilized State meter data

As indicated above, the Brunswick Canyon approximate annual losses can be calculated by taking the plant reclaimed flows and subtracting the reclaimed usage. The following summarizes the 2010- 2014 loss estimates:

Table 3 – RESERVOIR LOSS ESTIMATES

	2010	2011	2012	2013	AVE
Annual Plant Flow (MGD)	4.5	4.6	4.2	4.1	
Annual Plant Flow (Ac Ft)	5041	5153	4704	4593	
Annual Recl Usage (Ac Ft)	3358	3421	3251	3303	
Water Augment (Ac Ft)				200	
Reservoir Losses (Ac Ft)	1683	1732	1453	1490	1590

The Brunswick reclaimed storage reservoir fills during the winter and as irrigation season begins the reservoir is drawn down and refills again at the end of the year. Figure 3 indicates how the reservoir storage has varied from 2011 to present. The storage curves show the peak storage occurring in March-April and the refilling generally starting in September-October. A review of the storage curves indicates the adequate storage in 2011 and the 2012 season meeting the needs before dropping close to the shut off water surface elevation. Reviewing the 2013 curve indicates that the storage was approaching the shut off elevation before potable water augmentation began in August. This allowed for the storage volume to remain above the shut off elevation until reclaimed storage started to refill in October. Note that 2014 had started behind the previous years in total storage before irrigation started in March. Potable water augmentation started in April allowing the current storage curve to trend with the 2013 storage curve.

By studying the relationship of the previous plant flows, the reclaimed uses, the reservoir losses and the reservoir storage curves, projections of the reclaimed shortages and the related alternative solutions can be developed.

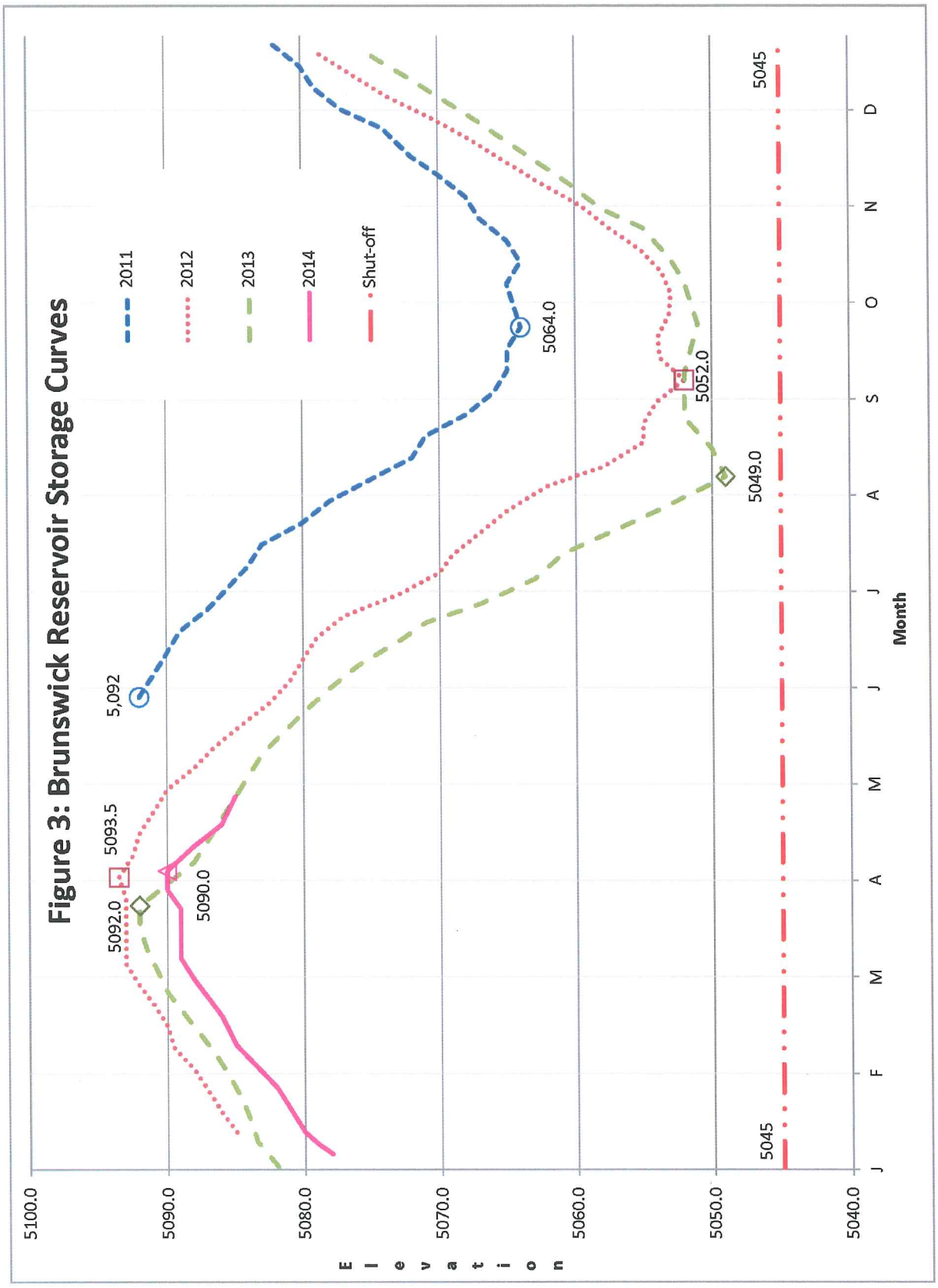


Figure 3: Brunswick Reservoir Storage Curves
2011
2012
2013
2014
Shut-off
5,092
5093.5
5092.0
5090.0
5064.0
5052.0
5049.0
5045
5045
5100.0
5090.0
5080.0
5070.0
5060.0
5050.0
5040.0
Elevation
J
F
M
A
M
J
J
A
S
O
N
D
Month

A review of the last four years of reclaimed water usage indicates that the Empire Ranch, Eagle Valley, and Silver Oak golf courses have had an increase in usage over the last two years while the Prison Farms have had a reduction in usage. This is likely explained by the reduced winter precipitation in the last two years requiring additional irrigation for the golf courses. The Prison Farms were asked to consider reducing their use. With their ability to reduce the planting areas, plant drought tolerant crops, and adjust amount of irrigation, they have achieved reduction in irrigation use. The reduction in the prison farm use has generally off-set the increase in golf course use, however, as indicated by the Brunswick reservoir storage curves and by the reduction in plant flows, there will be a shortfall for 2014.

As previously indicated, Public Works has removed the Parks facilities and the dust control fill stations from the reclaimed system thereby saving 160 to 200 acre feet of reclaimed water for use at the Prison Farms and golf courses. To estimate the shortfall for 2014, Manhard developed scenarios based on the last four years of use and with a likely range of Brunswick storage reservoir losses of 1600 to 2000 acre feet. The following table shows shortfalls estimating for each user the average use over the last four years, the highest use over the last four years, and the highest use over the last two years which might most likely reflect the drought year use for 2014. In addition, the minimum uses outlined in the user's agreements are also outlined. All of these scenarios are then coupled with a range of Brunswick reservoir losses from 1600 to 2000 acre feet. The following table summarizes the results:

Table 4 – RECLAIMED WATER SHORTFALL SCENARIOS (ACRE FEET)

	4-YR AVE	4-YR MAX	2-YR MAX	CONTRACT MINIMUMS
Prison Farms	1240	1510	1083	1100
Empire Ranch	628	765	765	790
Eagle Valley	830	920	920	1000
Silver Oak	450	486	486	500
TOTAL DEMAND	3335	3886	3254	3390
SHORTFALL:				
W/ 2000 AC FT LOSS	835	1386	754	890
W/ 1600 AC FT LOSS	435	986	354	490

Due to the Prison Farms being the highest user and the highest priority, it is clear that the Prison Farm use can have a high variable impact on the shortfall projections. Manhard Consulting met with the Prison Farms operators and discussed their usage. They indicated that while they would like to be able to use 1500 acre feet of irrigation water, they felt they would be able to stick to the minimum of 1100 acre feet which was very close to what was used in 2013. This provides a significant reduction in the range of potential shortfall that might be expected for 2014. With this assumption, the resulting shortfall range for 2014 would be 354 acre feet to 890 acre feet with the likely scenario being based on flows representing the last two year high values of 354 to 754 acre feet.

Carson City is well into the irrigation season for 2014 and the alternatives to respond to the shortfalls that might be available for consideration for future years are not likely attainable for this year. With that understanding, it is assumed that augmentation with potable water will have to be continued and increased to accommodate the estimated shortfall projections for 2014. Augmentation is currently being accomplished via a water pipeline discharging to the Stewart Ponds located off of Bigelow Drive in south Carson City. These ponds are the irrigation source for the Prison Farms and provide the most logical and inexpensive location to provide augmentation to the reclaimed system with potable water. The initial augmentation from late April into May has been approximately 1 million gallons per day or approximately 100 acre feet. Assuming the high end shortfall number of 890 acre feet, 790 additional acre feet will need to be augmented through approximately the end of September which will require 120 days of 2.15 million gallons per day. Available storage can be compared with the Brunswick storage curves and use information and augmentation can be adjusted if the lower range of the shortfalls are realized. Figure 4 shows the estimated Brunswick storage curves that would result without augmentation, with augmentation at the current augmentation rate and the proposed additional augmentation rate that will result in the same storage at the end of the year as shown at the beginning of the year.

With the assumption that potable water will be used to augment the reclaimed water shortfall for 2014, the related costs need to be estimated. With the reclaimed shortage challenge being a part of the wastewater facilities, the logic would be for the costs to be encountered and processed through the wastewater fund. With the water facilities providing the water augmentation, the water fund would logically charge the cost of the water production to the wastewater fund. Public Works has provided an initial estimated range of $0.60 to $1.00 per 1000 gallons for the production charge. This amount will require additional review to assure the appropriate rate and will allow for an approximate range of cost to be charged to the sewer fund for 2014. Again, assuming a range of shortfall to be augmented of 354 acre feet to 890 acre feet, the range of cost to be charged from the water fund to the sewer fund will be from $69,000 to $115,000 for the lower estimated use to a range of $174,000 to $290,000 for the higher estimated use. Actual metered use at the end of the augmentation period will determine the final charge. Public Works has indicated that the sewer fund could absorb the charge in the 2014 estimated operations costs but would require a solution to the shortfall for the following budget year and into the future.

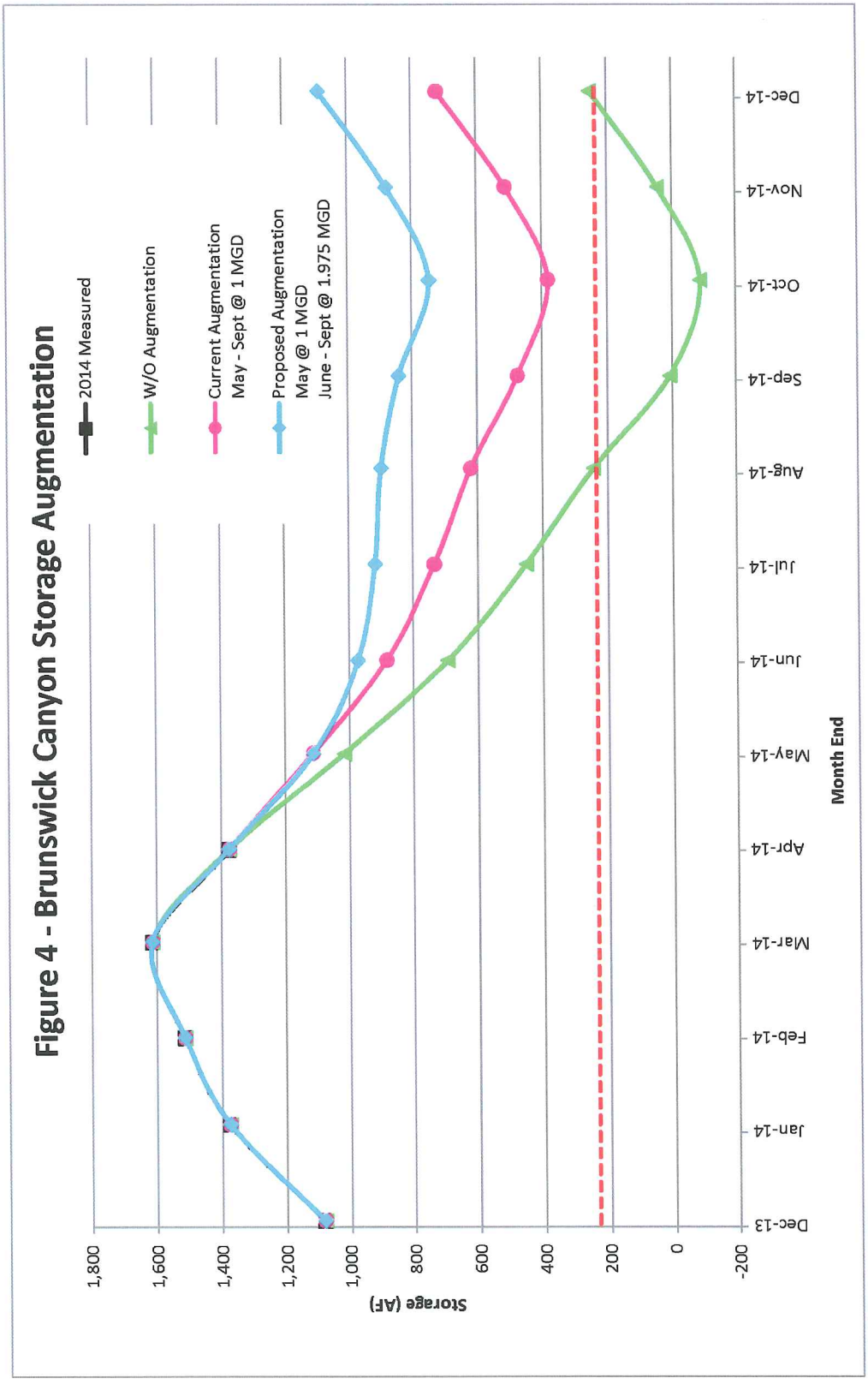


Figure 4 - Brunswick Canyon Storage Augmentation
2014 Measured
W/O Augmentation
Current Augmentation
May - Sept @ 1 MGD
Proposed Augmentation
May @ 1 MGD
June - Sept @ 1.975 MGD
Storage (AF)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
-200
Month End
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14

Additional review of the historical data indicates that it is likely that the shortfall will continue into the future. To estimate the range of time until the reclaimed water shortfall is eliminated, population growth rates of 0.5% and 2% were reviewed using the current approximation of 73 gallons per day per capita of wastewater use. Once again by utilizing the range of shortfall between 354 acre feet to 890 acre feet, it is anticipated that it will take between 15 and 36 years at 0.5% and 4 to 9 years at 2% growth to eliminate the shortfall. This is based on population growth. Business relocating to Carson City that have high wastewater use would shorten these time lines. As the shortfall is eliminated, parks and dust control fill stations can be re instated as reclaimed sites. It is important to note that as growth continues a solution for the additional reclaimed disposal should be planned. Developing and acquiring additional sites or conversion of the plant to additional treatment allowing for river disposal are considerations that have been proposed by the City's wastewater consultants. These considerations will have an impact on the future planning and budgeting for the wastewater system.

With the understanding that the current reclaimed water shortage will continue into the future, it is important to review alternatives to solving the shortage challenge. The first alternative would be to continue the augmentation with potable water. As indicated, the current range of costs for accomplishing this is $69,000 to $290,000 annually based on preliminary estimates of water production costs. If augmentation is the desired solution, the determination needs to be made as to how the costs are going to paid. The following are some alternatives for payment of the augmentation amount during the time period moving forward until the shortfall is eliminated:

Option 1- Absorb the $69,000 to $290,000 annual augmentation cost within the wastewater budget by reducing the capital improvement plan a like amount.

Option 2- Implement the previously reviewed commodity charge of $0.10 per 1000 gallons, thereby charging the reclaimed users an amount that would partially off-set the augmentation costs. For instance, based on the usage outlined by the minimum contract amounts, the following would be collected annually to off-set the $194,000 to $290,000 high end of the range of costs:

Prison Farms: 1100 ac ft ($35,840) Empire Ranch: 790 ac ft ($25,740)

Eagle Valley: 1000 ac ft ($32,582) Silver Oak: 500 ac ft ($16,291)

The remaining augmentation costs not covered by the commodity charge would reduce the capital improvement plan by a like amount.

Option 3- Implement a higher commodity charge that would cover the full cost of the augmentation. Again, based on the minimum contract amounts that generate the $194,000 to $290,000 augmentation costs, the resulting commodity charge would be $0.17 to $0.26 per 1000 gallons. The resulting range of costs to the users based on this scenario would be:

Prison Farms: ($60,930 to $93,187) Empire Ranch: ($43,759 to $66,925)

Eagle Valley: ($55,391 to $84,715) Silver Oak: ($27,695 to $42,358)

It is important to discuss the policy considerations for each of the options for payment of potable water augmentation to resolve the reclaimed water shortage challenge. Again, it is important to note that this is an engineering approach to the solution and will require legal analysis to determine the true legal impacts of the existing reclaimed agreements. With that said, Option 1 assumes that it is the responsibility of the Carson Wastewater Facilities and fund to provide the minimum amount of reclaimed water outlined in the wastewater agreements. Option 2 divides the responsibility of payment for the augmentation between Carson wastewater and the reclaimed users to resolve the shortage problem and Option 3 puts all of the cost to the reclaimed users. Economic impacts to the reclaimed user entities as well as regional economic impacts are significant considerations when reviewing the options. From a conservation standpoint, option 2 and 3 provide some conservation incentive due to the commodity charge.

Another consideration is to eliminate the need for potable water augmentation by temporarily eliminating a portion of the irrigated area utilizing the reclaimed water. To look at this option, Manhard collected the acreages for each of the irrigated sites to determine the amount of acreage that would have to be temporarily eliminated to remove the augmentation need. It is important to emphasize that this would be a temporary solution as the need for re-use sites will still be important with future growth. A review of the historical data indicates varying irrigation rates based on wet to dry weather years and from site to site. The following represents the acreages and the reclaimed use and application rates based on the last 4 year average:

Table 5 - RE-USE ACREAGES AND 4 YR AVE APPLICATION RATES

	Irrig Ac	4yr Ave Ac Ft	Rate Ac Ft/Ac
Prison Farms	491*	1240	2.53
Empire Ranch	195	628	3.22
Eagle Valley	213	830	3.90
Silver Oak	151	450	2.98
Total	1027	3148	3.07

*Represents acreage that has been reduced from 538 total acres through removal of fields from production

The 4 year average again has been used to represent the dry and wet year usage. From Table 4, the shortfall range for this scenario was 435 to 835 acre feet based on the 1600 to 1800 acre feet of losses in Brunswick Reservoir. Utilizing this range and the average application rate of 3.07 acre feet per acre, the amount of acreage required to be removed from irrigation to temporarily eliminate potable water augmentation would be 142 to 272 acres with an average of 207 acres.

This average calculation was utilized for the overall acreage and related acreage removal to not prejudice any one site or user. The intent of the calculation is to provide an amount of area that could be targeted for removal from the re-use area that will generally eliminate the need for potable water augmentation over the longer term.

Option 4-Consider removing approximately 200 acres from the re-use system to eliminate the need for potable water augmentation for the long term.

Clearly there are a number of considerations related to this option. The costs of removal of the re-use area from irrigation, the cost to replace in the future, the economic impacts of removal, and the legal impacts of the removal are just a few of the considerations. A more detailed look at the economics as well as the engineering associated with the targeted area will be required if Option 4 is determined to be a desirable option.

Alternatives to enhance the irrigation system at the various sites to try and more efficiently irrigate was also considered. However, the cost of irrigation system enhancement versus the amount of application reduction did not appear to be a viable solution. This option could also be further studied but with the range of costs associated with potable water augmentation, the costs of this option quickly eliminated it from consideration. In addition, replacement of the reclaimed use reduction in the future also helped eliminate the option.

Review of the various reclaimed water agreements from a legal standpoint is an important step in the management of the reclaimed water in the future. Recognizing that the agreements were generally based on Carson City having significant excess reclaimed water, an appropriate step would be to re-visit the agreements based on the current, un-predicted reclaimed shortage scenario.

SUMMARY

Carson City's Wastewater Treatment Plant has experienced a significant reduction in flows over the last 13 years and the reduction has resulted in a shortage of reclaimed water to satisfy all of the reclaimed users that have historically relied on the previous flows. A review of the historical data and the related documents has confirmed an annual reclaimed shortage in the range of 354 to 890 acre feet.

Carson City has removed Parks and dust control fill stations from the re-use system and now provides reclaimed water to the State Prison Farms, Empire Ranch Golf Course, Eagle Valley Golf Course, and Silver Oak Golf Course. Carson City Public Works recognized the reclaimed shortage in August of 2013 and provided potable water augmentation to get through the 2013 irrigation year. With another dry winter, augmentation was again started in late April of this year. With the irrigation season well underway, the potable water augmentation will continue and the amounts have been estimated to assure delivery to the various sites to complete the 2014 irrigation season.

The Carson City water fund will charge the wastewater fund for the potable water augmentation at a rate ranging from $0.60 to $1.00 per 1000 gallons. Utilizing the estimated range of reclaimed shortage, the cost will range from $69,000 to $115,000 on the low end to $174,000 to $290,000 on the high end. The actual metered flow at the end of the irrigation season coupled with a final production rate will determine the final charge for the year. Public Works proposes to absorb this cost into the 2014 operations budget, however, since the augmentation is likely to be required in the future, the following options for resolution are proposed:

Option 1- Absorb the $69,000 to $290,000 annual augmentation cost within the wastewater budget by reducing the capital improvement plan a like amount.

Option 2- Implement the previously reviewed commodity charge of $0.10 per 1000 gallons, thereby charging the reclaimed users an amount that would partially off-set the augmentation costs. The remaining augmentation costs not covered by the commodity charge would reduce the capital improvement plan by like amount.

Option 3- Implement a commodity charge in the range of $0.17 to $0.26 per 1000 gallons to cover the full cost of augmentation by the reclaimed users

Policy considerations include the responsibility of the reclaimed shortage either falling on the wastewater facilities and fund, the reclaimed users, or a combination of the two. Economic impacts both to the users and the region are a consideration as well. Option 2 and 3 do provide some incentive for conservation.

Based on a population growth rate of 0.5%, the reclaimed shortfall could extend from 15 to 36 years. However, if Carson realizes a growth rate closer to 2%, the shortfall will likely be eliminated within 4 to 9 years. These time periods are based on population growth and don't include the possibility of business growth contributing to wastewater flow increases. With this understanding, it's clear that the potable water augmentation costs may support another solution if Carson's growth rate remains low.

Option 4- Consider removing approximately 200 acres from the re-use system to eliminate the need for potable augmentation long term.

This option involves economic, engineering, and legal considerations depending on the approximate 200 acres targeted for removal. A more detailed look at these considerations are warranted if this is a desirable option and if it is believed that Carson's growth rate remains low thereby sustaining the costs for potable water augmentation resulting in significant long term costs.

Another alternative considered was investing in the enhancement of the irrigation systems throughout the re-use areas. Preliminary review of the costs versus the amount of re-use application reduction did not warrant further consideration.

In summary, after review of all of the documentation and analyzing the projections, the use of potable water for augmentation is a logical solution particularly considering the estimate ranges that have been developed based on the significant variables in the system. It might be most appropriate to continue the potable water augmentation for a few years to determine more specific shortage ranges and related costs. However, it will be important to choose one of the first three options to clarify how the reclaimed shortage costs will be paid. A few additional years of augmentation will further clarify more specific flows and costs. That time period may also shed light on the Carson's expected growth rate further clarifying the re-use shortage time period. More specific analysis of Option 4 may also be explored during this time period if Carson's growth rate remains low.

APPENDIX A

RECLAIMED USAGE
2010-2013
SPREADSHEETS

Manhard CONSULTING LTD

Flow Meter Summary by Year 2010 - 2013

Year	2010		2011		2012		2013*	
	gallons	AF	gallons	AF	gallons	AF	gallons	AF
Eagle Valley GC Usage	258,112,000	792	253,382,000	778	299,773,200	920	269,643,600	828
Empire Ranch GC Usage	174,807,000	536	173,021,000	531	221,436,000	680	249,394,000	765
Silver Oak GC Usage	139,527,161	428	136,934,029	420	158,418,617	486	151,417,169	465
Pet Cemetary	928,100	3	1,073,900	3	0	0	0	0
Governors Field	7,575,400	23	6,860,900	21	8,275,500	25	6,702,200	21
Upper Centenial Park	7,485,000	23	6,119,000	19	8,178,000	25	5,499,000	17
Saliman Landscape	110,960	0	91,050	0	92,500	0	98,470	0
Edmonds Park	22,787,800	70	23,861,200	73	27,821,000	85	27,804,700	85
Lone Mtn. Cemetery	7,255,400	22	6,708,400	21	8,744,400	27	6,634,200	20
Prison Farm Usage	455,065,070	1397	492,177,830	1510	315,429,000	968	352,897,097*	1083*
WWRP Landscape	125,700	0	87,300	0	71,100	0	66,300	0
Butti Way Reuse Overheads	107,900	0	360,800	1	100,200	0	159,900	0
Butti Way Reuse Hyd S.	87,000	0	824,000	3	320,000	1	80,000	0
Arrowhead Dr. Reuse OvrHd	3,668,000	11	2,643,000	8	1,459,000	4	0	0
College PrkWy	16,524,356	51	10,729,494	33	9,494,098	29	5,729,375	18
Total Million Gallons	1,094	0	1,115	0	1,060	0	977	0
Priority Customer Total	1,027,511,231	3153	1,055,514,859	3239	995,056,817	3054	1,023,351,866	3141
Total (gallons)	**1,094,166,847**	**3,358**	**1,114,873,903**	**3,421**	**1,059,612,615**	**3,252**	**1,076,126,011**	**3,303**

* Carson City Prison Farm meter error - State meter of 1083 AC-FT used for yearly total.

Manhard CONSULTING LTD

Priority Customer Flow Meter Summary by Month 2010 - 2013

	Month	Jan (gallons)	Feb (gallons)	Mar (gallons)	Apr (gallons)	May (gallons)	Jun (gallons)	Jul (gallons)
Eagle Valley GC Usage	2010	0	0	5,770,400	21,741,200	31,224,700	39,712,200	60,994,500
	2011	434,000	22,000	1,289,000	20,093,800	28,939,600	36,617,300	46,797,500
	2012	2,016,000	1,930,000	12,212,000	25,860,200	47,437,200	47,702,800	47,677,200
	2013	255,000	0	12,126,000	26,789,400	38,063,600	44,736,800	54,479,800
Empire Ranch GC Usage	2010	0	1,000	934,000	17,979,000	19,081,000	26,895,000	39,633,000
	2011	0	1,000	730,000	13,421,000	17,572,000	26,163,000	30,968,000
	2012	1,841,000	3,337,000	10,514,000	17,812,000	33,672,000	34,592,000	38,659,000
	2013	0	1,597,000	7,636,000	19,070,000	33,980,000	32,905,000	44,960,000
Silver Oak GC Usage	2010	0	2,221	1,248,217	7,170,096	11,025,893	22,661,583	36,702,636
	2011	0	0	105,110	8,896,950	16,866,503	18,474,103	27,329,918
	2012	1,385,613	544,590	1,158,623	10,059,154	24,083,054	25,039,678	26,757,435
	2013	0	1,340,401	7,052,079	12,645,298	21,153,703	25,784,688	28,075,000
Prison Farm Usage	2010	0	0	711,000	3,969,960	60,158,170	81,118,460	119,698,590
	2011	0	5,000	5,000	8,172,830	58,668,000	89,961,000	110,369,000
	2012	0	0	8,032,000	19,776,800	69,499,380	48,443,090	44,693,190
	2013*	0	0	8,367,100	39,304,260	67,099,030	46,266,810	0
Monthly Total	2010	0	3,221	8,663,617	50,860,256	121,489,763	170,387,243	257,028,726
	2011	434,000	28,000	2,129,110	50,584,580	122,046,103	171,215,403	215,464,418
	2012	5,242,613	5,811,590	31,916,623	73,508,154	174,691,634	155,777,568	157,786,825
	2013*	255,000	2,937,401	35,181,179	97,808,958	160,296,333	149,693,298	127,514,800
Max Month	2010-2013	5,242,613	5,811,590	35,181,179	97,808,958	174,691,634	171,215,403	257,028,726

* Carson City Prison Farm meter error - State meter of 1083 AC-FT used for yearly total.

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Priority Customer Flow Meter Summary by Month 2010 - 2013

	Month	Aug (gallons)	Sep (gallons)	Oct (gallons)	Nov (gallons)	Dec (gallons)	Total (gallons)	Total (AF)
Eagle Valley GC Usage	2010	39,510,800	50,184,500	4,385,100	3,221,800	1,366,800	2.58E+08	792
	2011	43,655,700	41,462,800	22,525,100	2,183,200	9,362,000	2.53E+08	778
	2012	51,552,000	28,251,800	25,995,000	9,139,000	0	3.00E+08	920
	2013	32,240,000	30,902,000	23,731,000	6,320,000	0	2.70E+08	828
Empire Ranch GC Usage	2010	28,508,000	33,876,000	7,874,000	26,000	0	1.75E+08	536
	2011	27,293,000	31,402,000	13,968,000	9,289,000	2,214,000	1.73E+08	531
	2012	35,876,000	22,230,000	16,699,000	6,204,000	0	2.21E+08	680
	2013	32,600,000	37,586,000	27,530,000	11,530,000	0	2.49E+08	765
Silver Oak GC Usage	2010	26,396,314	27,942,635	6,024,747	3,685	349,134	1.40E+08	428
	2011	25,766,158	24,871,238	8,531,127	3,628,534	2,464,388	1.37E+08	420
	2012	32,020,784	18,963,601	14,650,182	3,755,903	0	1.58E+08	486
	2013	21,910,000	18,086,000	12,100,000	3,270,000	0	1.51E+08	465
Prison Farm Usage	2010	81,119,070	98,123,820	10,166,000	0	0	4.55E+08	1397
	2011	84,236,000	89,054,000	51,510,000	202,000	0	4.92E+08	1510
	2012	66,754,390	25,264,100	32,105,750	860,300	0	3.15E+08	968
	2013*	30,953,000	39,325,320	22,437,120	421,000	0	3.53E+08	1083
Monthly Total	2010	175,534,184	210,126,955	28,449,847	3,251,485	1,715,934	1.03E+09	3153
	2011	180,950,858	186,790,038	96,534,227	15,302,734	14,040,388	1.06E+09	3239
	2012	186,203,174	94,709,501	89,449,932	19,959,203	0	9.95E+08	3054
	2013*	117,703,000	125,899,320	85,798,120	21,541,000	0	1.02E+09	3141*
Max Month	2010-2013	186,203,174	210,126,955	96,534,227	21,541,000	14,040,388	1.28E+09	3914

* Carson City Prison Farm meter error - State meter of 1083 AC-FT used for yearly total.

APPENDIX B

AERIALS OF RE-USE SITES


BRUNSWICK RESERVOIR
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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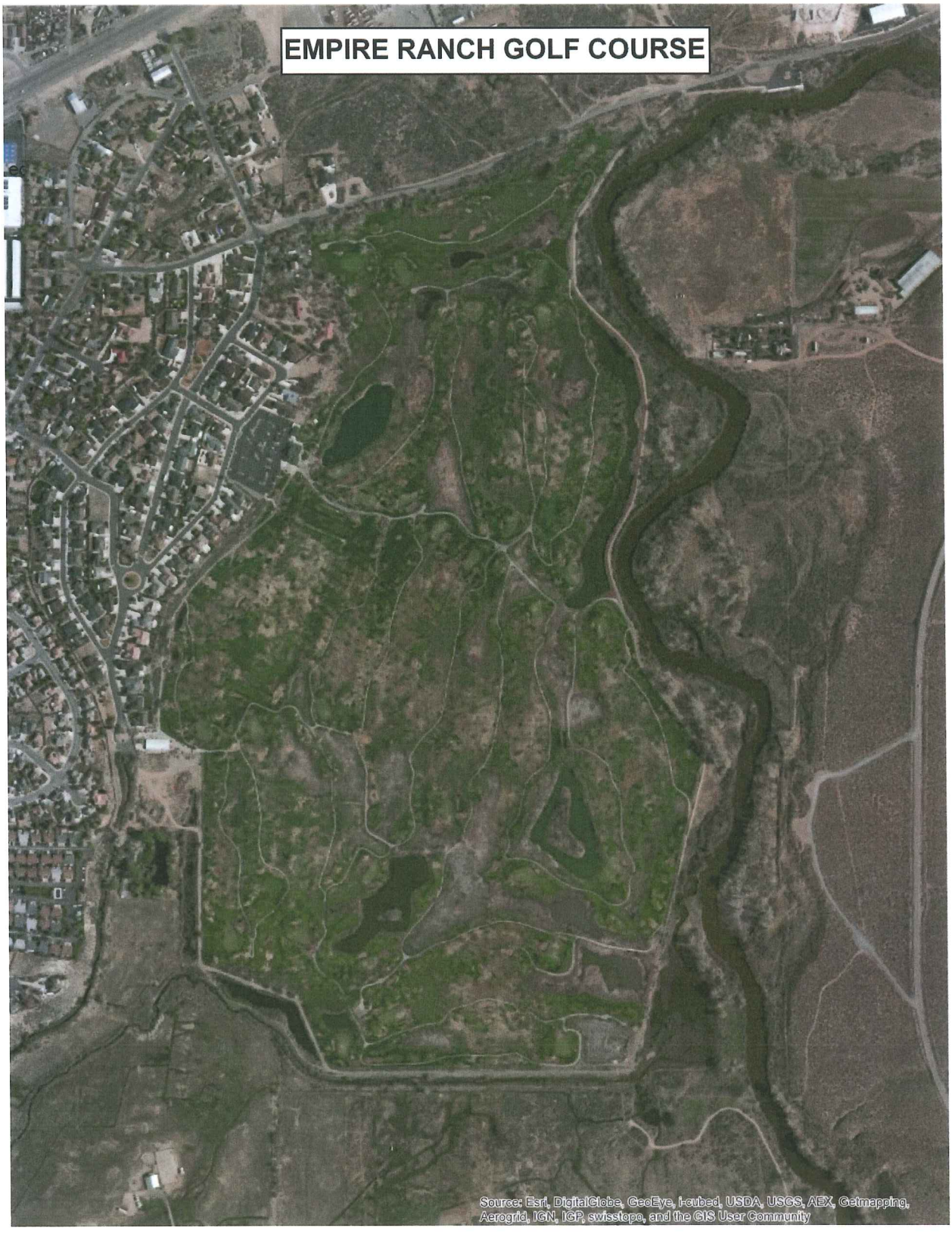

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